

JPRS 82863

15 February 1983

USSR Report

CHEMISTRY

No. 97



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ADSORPTION

CHEMISTS' CONFERENCE FOCUSES ON USE OF SORBENTS

Baku VYSHKA in Russian 18 Nov 82 p 4

[Azerinform article: "Chemists' Conference"]

[Text] One of the global problems facing science in the 20th century is the reclamation of industrial wastes. Lakes of sewage, mountains of processed material, and clouds of gas--these are the sad signs of modern production. In the fight for ecologically-clean production processes, the last word belongs to the chemists. Veritable wizards of reactions, they have learned not only how to purify wastes, but also, with the help of special compounds--sorbents--to reclaim valuable chemical elements from them.

Questions of obtaining new, effective sorbents and ways of using them were discussed by participants of the Fifth Trans-Caucasian Conference on Adsorption and Chromatography, which began its work on 17 November at the Azerbaijan Academy of Sciences Institute of Inorganic and Physical Chemistry.

"The conference is dedicated to the 60th anniversary of the formation of the USSR, and in this glorious jubilee year, the multi-faceted ties between scientists and manufacturers in the fraternal republics are especially evident," said Azerbaijan Academy of Sciences corresponding-member Z. Zul'fugarov to a correspondent of Azerinform. "The task facing scientists at the present stage is the quickest possible introduction of research results into industry. That is why representatives of Baku and Sumgait chemical enterprises are also taking part in the work of the conference. Already, sorbents and catalysts born in the laboratories are bringing hundreds of thousands of rubles to the economy. Boron, lithium, mercury, arsenic, and other valuable elements are successfully being extracted from sewage and stratal water."

And the range of uses for sorbents is continually expanding.

A good illustration of this assertion is the present chemists' conference, where a series of papers was presented by...medical personnel.

One of the authors of these articles, Corresponding-Member of the USSR Academy of Medical Sciences, Academician of the Azerbaijan Academy of Sciences, USSR State Prize winner M. Dzhabad-zade, explained this as follows:

"Sorbents are being used successfully in urological practice in cases of poisoning. We have conducted experiments which show that sorbents are also effective for many other diseases and, in particular, can function in place of an artificial kidney. Here, however, much research still lies ahead, and the purpose of our appearance is to get chemists interested in the new areas where their scientific developments can be used."

The Trans-Caucasian Conference on Adsorption and Chromatography is being held in Baku for the second time. During the three days it runs, participants will listen to and discuss more than 150 papers and reports.

12255

CSO: 1841/87

UDC 641.4:542.61:547.26

EXTRACTIVE PROPERTIES OF N-(O,O-DIISOPROPYLTHIOPHOSPHORYL)THIOBENZAMIDE

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 10, Oct 82
(manuscript received 21 Sep 81) pp 1739-1743

TOROPOVA, V. F., LAZAREVA, G. A., BATYRSHINA, F. M. and ZIMIN, M. G.,
Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] In continuation of studies on the extractive properties of compounds containing a thiophosphoryl group, it was of interest to determine the properties of thiobenzamide compounds containing this group and the thiocarbonyl group as well. Hence, the complexing and extractive properties of N-(O,O-diisopropylthiophosphoryl)thiobenzamide (PTB) were studied. Composition of copper (II) complexes was shown to be CuL_2 ; this was also demonstrated for mercury (II) and silver (I) complexes. IR spectroscopy revealed that PTB coordinates with metal ions through P=S and C=S groups. CCl_4 , which yielded the highest distribution coefficient for PTB, was selected for extraction of metal complexes with PTB. Complexes with silver and mercury were extracted in a highly acidic medium. Copper (I) and copper (II) were extracted in the pH range of 1.5-9.8. Cobalt, nickel, cadmium, lead and zinc complexes were extracted only in alkaline media. A simple and rapid procedure was developed for the extraction--spectrophotometric determination of copper with PTB. Quantitative separation of copper (II) from iron (III) with PTB was used to determine iron (III) in copper alloys. Figures 2; references 6: 5 Russian, 1 Western.
[68-9307]

DETERMINATION OF COBALT, IRON AND NICKEL BY HIGH PRESSURE LIQUID CHROMATOGRAPHY

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 10, Oct 82
(manuscript received 8 Oct 81) pp 1833-1836

GALUSHKO, S. V., SHISHKINA, I. P. and USATENKO, Yu. I., Ukrainian Center for Standardization and Metrology, Kiev; Dnepropetrovsk Institute of Chemical Engineering

[Abstract] A rapid and selective method was developed for separating and determining cobalt (III), iron (III) and nickel (II) by high pressure liquid chromatography (HPLC) of complexes between the metals and 1-(2-pyridylazo)-2-naphthol (PAN). Chromatography followed extraction and was performed in a glass column packed with silica gel or Silochrome; two extractions were performed if both iron (III) and nickel (II) were present. The eluent was a 4:1:5 mixture of $C_6H_{14}:CHCl_3:C_2H_5OH$ with small amounts of acetic acid. A scanning spectrophotometer was used as the detector. PAN--Ni (II) and Fe (III) complexes separated under HPLC conditions, and the cobalt (III) complex eluted after PAN. Preliminary oxidation of cobalt (II) to cobalt (III) was unnecessary, since this occurred during PAN extraction. Optimal detecting range was 520-560 nm. The height of chromatographic peaks was directly proportional to metal concentration. Lower range of sensitivity was 0.05, 0.13 and 0.30 $\mu g/ml$ of the metal in the extract for iron, nickel and cobalt, respectively. Presence of large quantities of copper (II), zinc, manganese (II), chromium (III), cadmium, or mercury (II) did not interfere with the determination; this was regarded as an advantage over extraction-photometric determination of these metals. Figures 3; references 10: 6 Russian, 4 Western.
[68-9307]

UDC 543.42.062(088.8)

PHOTOMETRIC DETERMINATION OF ETHYL ALCOHOL IN GASES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 10, Oct 82
(manuscript received 14 May 81) pp 1858-1864

STENTSEL', I. I. and FILIPPENKO, N. P., Rubezhanskiy Branch, Voroshilovgrad Institute of Mechanical Engineering [Machine Building]

[Abstract] Justification of a photometric method to determine ethyl alcohol vapor with the use of a reagent-treated indicator tape was substantiated theoretically and experimentally. The determination was based on the conversion of ethyl alcohol to an aldehyde with kaolin as the catalyst, and subsequent reaction with fuchsin sulfurous acid. Ethyl alcohol was measured

on an FLS1.1 gas analyzer with use of the indicator tape, previously treated with a mixture of fuchsin sulfurous acid and 0.7% hydrochloric acid (1:1 ratio) and glycerol, in a gas mixture containing formaldehyde, aniline, phenol and resin fumes under industrial conditions. Method sensitivity was 100 mg of ethyl alcohol/m³ of gas. Relative error was 6.8% and reproducibility 8.0%. Stability of the treated tape exceeded a year. The use of the batch-produced FLS1.1 gas analyzer makes this method widely usable by industry for automated measurement of ethyl alcohol in gas. Figures 2; references 18: 1 Czech, 10 Russian, 7 Western.
[68-9307]

UDC 543.8:547.233

TETRACYANOQUINODIMETHANE AS REAGENT FOR SPECTROPHOTOMETRIC DETERMINATION OF NITROGEN BASES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 37, No 10, Oct 82
(manuscript received 17 Sep 81) pp 1894-1896

OBTEMPERANSKAYA, S. I. and EZZAT EL KAFRAVI AZZA, Moscow State University
imeni M. V. Lomonosov

[Abstract] A spectrophotometric method was proposed for determining aliphatic mono- and diamines and alicyclic, aromatic and heterocyclic amines as charge-transfer complexes with tetracyanoquinodimethane (TCQD) or TCQD anion radicals. A stable color was obtained within 3-20 min for most aliphatic monoamines; more time was required for aliphatic diamines. The molar absorption coefficient was 1600-8700 for aliphatic mono- and diamines, 1700-16,000 for aromatic amines, and 1500-9000 for heterocyclic amines. Compounds could be detected at concentrations of 10⁻⁴-10⁻⁵ moles/liter. Standard deviation was 0.01-0.03. Figures 1; references 3: 2 Russian, 1 Western.
[68-9307]

UDC 543.257.1

MEASURING BROMINE IN BIOCHEMICAL PREPARATIONS AND PRODUCTS OF THEIR SYNTHESIS BY BROMIDE-SELECTIVE ELECTRODE

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA
in Russian No 5, Sep-Oct 82 (manuscript received 8 Sep 81) pp 595-598

DIMANTE, A. I., LIPETS, Ye. V. and VEVERIS, A. Ya., All-Union Scientific Research Institute of Applied Biochemistry, Scientific Production Association "Biokhimreaktiv"

[Abstract] Volumetric, gravimetric and calorimetric methods of assay of halides have several shortcomings, including expenditure of scarce and

expensive silver salts, use of poisonous mercury salts, and labor-consuming procedures. The authors studied the possibility of using bromide-selective electrodes to analyze biochemical preparations containing bromine, intermediate products of their manufacture and inorganic bromide impurities such as KBr and NaBr. A calibrated concentration curve helped to assay absolute quantities of substances measured. Several buffer solutions, including triethanolamine, citrate, acetate and phosphate types were tested. For small amounts of bromides (0.7-2%) a divergence between standard and the experimental method of as much as 6% was noted, while standard deviation with the ion-selective method was 6.9%. Analysis of synthetic mixtures of monoureide of 2-bromomaleic acid and potassium bromide showed accurate and replicable results when quantities of at least 0.5% were present. A shortcoming of the electrode tested was its slow generation of full potential, which may explain its relative inaccuracy with lower concentrations of bromine. Figures 1; references 12: 7 Russian, 5 Western.
[90-12131]

UDC 579.083.13

EFFECTIVENESS CRITERION OF MICROORGANISM CULTIVATION PROCESS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 11, Nov 82
(manuscript received 12 Apr 82) pp 1292-1295

BALYABINA, T. M. and LALOV, V. V., All-Union Scientific Research Institute
for Biosynthesis of Protein Substances, Moscow

[Abstract] Microbiological industrial production of vaccines, serums, antibiotics and protein substances has continually earned a larger share of their total industrial production. The current study is aimed at developing an effectiveness criterion for evaluating microorganism cultivation on the basis of an economic analysis of the pertinent technology and equipment. The process is diagrammed and calculations presented and explained. By using general economic and technological analysis, the authors claim establishment of a universal criterion that can be applied to evaluating the effectiveness of processes of microbiological synthesis for various purposes. Figures 1; references 2 (Russian).
[85-12131]

UDC 06.053.621:663.1

ALL-UNION SCIENTIFIC TECHNICAL CONFERENCE ON EQUIPMENT PRODUCTION FOR
MICROBIOLOGICAL INDUSTRY

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 11,
Nov 82 pp 40-43

MONASTYRSKAYA, A. M., engineer

[Abstract] The conference was held in June 82 in Irkutsk; it was organized in two sections: "Equipment for microbiological synthesis" and "Equipment for Hydrolysis". Chairman of the organizing committee V. G. Usenko opened the conference stating the goals and tasks ahead. A. M. Karpov concentrated on developments of new yeasts capable of high yields of proteins from easily

obtainable raw material. Fermentors for production of feed protein were discussed by A. M. Kuznetsov, et al. P. D. Grigor'yev et al. reported on new hydrolysis equipment already in practical use and in developmental stages. Equipment is being developed for hydrolysis of peat moss, cotton pods, corn husks, agricultural wastes, etc. Other topics included construction of pumps for transport of gas-saturated liquids; developmental studies on cultures grown on strongly foaming cultures without recourse to foam-quenching agents and analysis of oxygen transport rates in gas lift equipment. Several papers were devoted to production of fermentors for sterile type processes for medical use, etc. The Section on Hydrolysing Equipment heard several papers on the performance of a variety of continuously operating hydrolysers. Considerable improvements are under way in the area of periodic action hydrolyzers. At the concluding plenary session, recommendations were made to accelerate development and introduction into practice of these new developments. Primary attention is to be placed on modernization of present equipment.

[72-7813]

CATALYSIS

UDC 541.124.128

PROBLEMS OF ACID-BASE CATALYSIS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 48, No 11, Nov 82
(manuscript received 20 Feb 81) pp 1130-1136

GONCHARUK, V. V., Institute of Colloid Chemistry and Water Chemistry
imeni A. V. Dumanskiy, UkSSR Academy of Sciences

[Abstract] The author reviews studies of the title problems and their contributions in finding active and selective catalysts, and developing theoretical foundations for catalyst use. The matter of correlation between catalytic activity and surface acidity still remains incompletely understood. Research has included studies of reactions of an acid-base type from the Bronsted theory viewpoint as a proton-transfer process, measurements of surface acidity of solid catalysts, including measurements of the number and strength of acid centers and their nature, effectiveness of the thermodynamic method, features of a system with varying solvent and phasal condition of the indicator, adsorption potential of acid centers as the key parameter, and limiting features of the activating complex, e.g., its composition, structure and properties. As an example, analysis of experimental entropy of the cracking reaction of cumene and dehydration of isopropyl alcohol led to the conclusion that the mechanism of acid-base reactions takes place through the stage of complex formation of the reactant with the acid center, independent of its type. The type of acid center is an essential but insufficient parameter for understanding the nature of the catalytic action. References 33: 22 Russian, 11 Western.
[89-12131]

EFFECT OF MODIFICATION OF INDIUM OXIDE CATALYST WITH POTASSIUM OXIDE ON
PRODUCTION OF COKE DURING PYROLYSIS OF HYDROCARBON CRUDE

Moscow NEFTEKHIMIYA in Russian Vol 22, No 5, Sep-Oct 82

(manuscript received 9 Oct 81) pp 602-607

YEGIAZAROV, Yu. G., CHERCHES, B. Kh, KRUT'KO, N. P., POTAPOVA, L. L. and
KORKHOV, O. A., Institute of Physical-Organic Chemistry, BSSR Academy of
Sciences

[Abstract] The yield of low molecular weight olefins from pyrolysis of hydrocarbon crudes may be increased by application of effective, selfregenerating catalysts. This may be achieved by modifying the catalysts with salts or oxides of alkali metals. Effect of such a modification of indium oxide with potassium oxide on the formation of coke during pyrolysis of hydrocarbon crude was studied. Experimental pyrolysis of butane in presence of water vapor showed that potassium oxide lowers considerably formation of coke. The rate of coke accumulation decreases with increased concentration of the modifier. In pyrolytic experiments with paraffin and aromatic hydrocarbons, maximum rate of coke formation was observed with aromatic hydrocarbons and minimal - with paraffins. Catalytic activity of modified catalyst remained constant through the entire experiment. The coke being deposited on the surface of modified catalyst had a porous dendritic structure. Figures 2; references 15: 13 Russian, 2 Western.
[74-7813]

CHEMICAL INDUSTRY

UDC 677.463.004.69

RECONSTRUCTION OF VISCOSE FIBER INDUSTRY

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 82
(manuscript received 20 May 82) pp 12-14

ZOTIKOVA, O. N., BRAGINA, Z. V. and SERKOV, A. T.

[Abstract] In accord with the requirements of the 26th CPSU Congress, industrial modernization will be high priority from 1981-1990. In the viscose fiber industry, where output growth has slowed since 1973, replacement of frame and plate filter presses with filtration devices--using continuous deaeration and improvement of spinning-finishing machines using spinnerets with 10,000 to 12,000 apertures--has been undertaken to eliminate bottlenecks. Auxiliary measures such as water purification and energy control are seen to be limited in their benefits; complete re-equipment of a plant is often needed. This is reflected in the increase in spinning-finishing machines in service for 20 years or more, from 12% in 1970 to 35% in 1980. Worker and environmental protection progress also requires new equipment types, particularly for removal and regeneration of carbon disulfide. Flush water regeneration via vacuum evaporation, new spinnerets with 19,500-54,000 apertures and improved cutting machines can increase viscose fiber production by 96%. The data indicate that further modernization of viscose fiber factories would be expedient. Figures 3; references 2 (Russian). [66-12126]

WORLD PRODUCTION OF CHEMICAL FIBERS IN 1976-1980--REVIEW

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 82
(manuscript received 17 May 82) pp 14-19

FEDORENKOV, A. A., MITROFANOVA, T. G., BURLYUK, B. V. and KRYUKOVA, N. N.

[Abstract] World production of synthetic fibers has increased sharply in most years, from 1970 to 1980, while production of artificial fibers has remained essentially flat. Growth in chemical and synthetic fiber production was greatest in the developing countries, intermediate in communist countries and lowest in the developed capitalist countries. The proportion of staple fibers, from 1976 to 1980, increased due to their use in carpets and fiber blends. Among the synthetic fibers, polyesters showed the strongest growth, while polyamides had the weakest. In addition to the carpet industry, which is most important in the US, Great Britain and Japan, polyamides are also used in tires, with production tied to that of automobiles. The growth predicted for polyester fibers is connected with their many textile applications. Polyacrylonitrile fibers, chiefly used to replace wool in clothing and blankets, need to be modified for fire and heat resistance. Polyolefins, particularly polypropylene, which have low energy production requirements, are used in carpets, nonwoven fabric, upholstery and ropes. Due to economic factors, artificial fibers like viscose and acetate are being replaced by synthetic. However, research to improve the technology of such cellulosic fibers is active. Recently, improvements in hygroscopicity, antistatic properties and appearance have led to new fibers such as quiana, cotlan, new polyacrylonitriles and textured polyesters and polypropylenes. Low twist polyamide tire cord and insulators are also promising. Future trends include further cost reduction and growth in synthetic fiber production. Figures 1; references 55: 6 Russian, 49 Western.
[66-12126]

UDC 66.094.3.001.57:[661.547.673.6]

MODELING OXIDATION OF ANTHRAHYDROQUINONES IN PRODUCTION OF HYDROGEN PEROXIDE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 11, Nov 82 pp 655-658

MARTYUSHIN, Ye. I., FILIMONOV, P. I., SMIRNOVA, O. N. and GORBUNOV, A. I.

[Abstract] World growth of hydrogen peroxide production has been matched by research to improve the basic production process involving anthraquinones. The authors have developed a mathematical model for calculating parameters of a pilot industrial oxidation system for making hydrogen peroxide. The coefficient of absorption acceleration due to the chemical reaction is a major factor in describing the process. Theoretical calculations based on

the derived mathematical description of the process are shown to exceed actual experimental values for that coefficient. Adjustments had to be made in the calculations to provide for the dependence of reaction rate on the concentration of dissolved oxygen. References 12: 6 Russian, 6 Western.
[82-12131]

COAL GASIFICATION

UDC 662.74:661.51.011.56

SYSTEM FOR AUTOMATING PROCESS CONTROL IN SYNTHESIS OF AMMONIA FROM COKE OVEN GAS

Moscow KOKS I KHIMIYA in Russian No 11, Nov 82 pp 43-44

MINAKOV, A. S., KOPYTOV, V. F., Novolipets Metallurgical Plant,
MEDVEDEV, R. B. nad FEDOROV, A. V., Kiev Polytechnical Institute

[Abstract] From 1973 to 1980 an automated process-control system based on the M1010-ASVT computer was developed for control of the synthesis of ammonia from coke oven gas in the section for nitrogen fertilizer production at the Novolipets Metallurgical Plant. Significant fluctuations in the load of nitrogen-hydrogen mixture, use of secondary condensate liquid ammonia for cooling and use of bypass lines for partial control are system characteristics. The system can emphasize either complete conversion of incoming gas or minimum energy useage. Initial conditions, synthesis block operation and adjustment, synthesis block temperature and nitrogen-hydrogen mixture composition are controlled in a hierarchial manner. Introduction of the system resulted in a savings of about 200,000 rubles per year. An improved system, based on the SM-2 computer, is being developed. Figures 2; references 7 (Russian).
[65-12126]

FRONTAL AND VOLUME COMBUSTION BEHAVIOR OF GASEOUS MIXTURES

Moscow KHIMICHESKAYA FIZIKA in Russian No 11, Nov 82
(manuscript received 20 Jun 82) pp 1551-1556

GUSSAK, L. A. and NOVOZHILOV, B. V., Institute of Chemical Physics, USSR
Academy of Sciences, Moscow

[Abstract] The combustion process was analyzed with an assumption that the rate of chemical reactions in the initial mixture at the starting temperature was different from zero. The front of the flame advancing in such a mixture compresses the components ahead due to expanding combustion products. In this fashion the mixture is heated and chemical reactions are accelerated. With sufficient compression, this mixture may ignite spontaneously, thus leading to drastically increased internal pressure. In this study a simple model was selected: a bimolecular reaction with large activation energy. In such a model the flame front is rather narrow in comparison to the volume of the container. The calculations could be made on the basis of experimental data on the relationship of the front and the spontaneous ignition period to pressure and temperature, but such data are unavailable for most of the real systems. The model analyzed was based on an ideal gas, constant heat capacity, constant pressure throughout the volume, unchanged molecular mass of the gas, constant combustion rate along the front representing a break in temperature, gas density and concentration of starting materials and combustion products. A system of equations was developed describing such a combustion process with convergent spheric front. Figures 2; references 6 (Russian).
[71-7813]

FORMATION OF NITROGEN OXIDE IN TURBULENT FLAME

Moscow KHIMICHESKAYA FIZIKA in Russian No 11, Nov 82
(manuscript received 23 Apr 82) pp 1557-1561

BASEVICH, V. Ya., KOGARKO, S. M., PASHKOV, V. Yu. and TYURIN, A. N.,
Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] Experiments were carried out on hydrocarbon-air flame, examining the patterns controlling formation of NO from the fuel and air nitrogen and studying the effect of turbulence on this process. The following variables were investigated: air-hydrocarbon (methane) mixture, pressure, flow rate and the effect of a nitrogen-containing additive, pyridine. NO yield from air nitrogen increased with temperature and pressure increase. Temperature had also a direct relationship to NO yield from fuel nitrogen, but the effect of pressure was inverse. NO yield dropped somewhat with increased the yield of NO. It was concluded that lowering the temperature, during the combustion process of methane with pyridine additives, leads to a drop of the relative yield of NO from fuel nitrogen at the time when this mixture was being depleted. Figures 4; references 8: 4 Russian, 4 Western.

[71-7813]

UDC 662.753:621.454

TEMPERATURE EFFECT OF JET FUELS ON WEAR RATE OF OSCILLATION FRICTION WITH SLIPPAGE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, Nov 82
pp 28-30

GORENKOV, A. F. and DOMKIN, Ye. I.

[Abstract] Fuel temperature in fuel system aggregates of aircraft and engines varies in a wide range depending on design, flight conditions and operational processes. Changes in the lubricating medium can cause changes in rate and direction of friction and wear as changes occur in viscosity, concentrations of dissolved gases, and the rates of chemical, diffusional, adsorption and chemisorption processes. At 120-150° C, slip friction causes monotonic acceleration of wear, while with oscillation friction the wear rate increases in the range of 60-90° C, then slows again at higher temperatures. This phenomenon varies in accordance with the precise composition of the fuel. Without antioxidant additives the peak wear is at 80-100° C, while with such additives the range is 100-110° C. Addition of ionol causes improved wear properties up to 70° C, but at higher temperatures, due to accumulation of surface-active compounds, wear again increases. In general, results point to the need for tailoring additives to the temperature of operation of individual aircraft and the conditions in which they fly. Figures 2; references 13 (Russian).

[91-12131]

FERTILIZERS

DEVELOPMENTS AT AZOT PRODUCTION ASSOCIATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 45, Nov 82 p 7

[Article by A. A. Zuyev, director of the Azot Production Association:
"Endeavors and Concerns of Novomoskovsk Chemists"]

[Text] The collective of the Novomoskovsk Azot Production Association will observe the 50th anniversary of its founding in the coming year. During the years of its existence, the chemical giant has more than once become the proving ground for new technology and manufacturing methods in the production of mineral fertilizers. In the Eleventh Five-Year Plan, the Novomoskovsk chemists are following a course of early assimilation of capacity, increased production for the rural areas, and lowering its costs and expenditure of labor.

This theme is the subject of an article by Association Director Aleksandr Andreyevich Zuyev. In 1953 he graduated from the Khar'kov Polytechnical Institute. At the chemical combine in Novomoskovsk, he advanced from shift captain to head engineer. Since 1976 he has been Association Director. A. A. Zuyev is a Candidate of Technical Sciences.

1959 will be remembered as the year when the ammonia facility in Novomoskovsk was converted from coke to natural gas. In like manner, a change to cheaper and more suitable raw materials led to a 38 percent decrease in the prime cost of a ton of ammonia, benefitting the economy of our enterprise.

At the present time, we can't expect to get such a significant effect all at once. But there are other factors at our disposal for making production less expensive. These are: increasing the coefficient of utilization of production capacity, decreasing the expenditure norms of material and energy resources, raising labor productivity, and a regime of economy in all its forms.

I was interested to read Khar'kov Bearing Plant Director S. N. Ivanov's article "We Are Lowering Production Prime Costs," published in the 34th issue of the newspaper. Our association is also working in this direction.

Assimilating Capacity Ahead of Schedule

We are counting on putting large-tonnage facilities into operation. Taking ammonia, again, as an example, the start-up of machines with large unit capacity was accompanied by a reduction in the prime cost, averaging 14 percent. Under the energy-conservation technological layout, energy consumption in the new facility has been reduced by several times.

For large-tonnage equipment and high-output production lines, the control of operations is carried out by means of computer technology. The high-power machinery for ammonia production, for example, now requires 80-95 men to operate it, whereas the operation of equipment for the same output ten or twelve years ago, in 1970, required six times that number of people. And hence--a decrease in the prime cost of production.

In recent years, unique large-tonnage complexes have been placed on stream in production of mineral fertilizers and raw materials for them. Chemists immediately joined in the struggle to reach projected capacity of the giant shops ahead of schedule.

Here is a most graphic illustration of initiative and creativity, and the high sense of responsibility of the workers, engineers, and technicians for resolving the task that stands before them. The attention of the entire collective of the association was riveted on the new machines. The high qualification of the shops' personnel and their proper selection have the decisive role in this.

Even during preparations to put the complexes in operation, questions of organizing the staff of operators were the object of particular concern from the party committee and the board of directors. Party members and the best, most enterprising laborers were assigned to positions of responsibility. By the time the new production was to start operation, party members and candidates formed half of the entire work force. The following communists arrived here and displayed their fighting talents: Operator O. Ya. Pavlukhin, member of the association's party committee bureau; Senior Operator A. V. Posvezhinyy, who lately was awarded the USSR State Prize, and experimental specialists V. S. Vorob'yev and N. A. Morozov, who headed the collectives.

On the initiative of the workers, socialist competition was undertaken under the slogan "The Way to the Highest Productivity in Work and in This Sector of the Economy Is a High Sophistication Level in Production." The party committee and board of directors struggled unceasingly to actively introduce into production the achievements of science and technology, the scientific organization of labor, and progressive experience.

With great enthusiasm the workers of the association were hailed by Comrade L. I. Brezhnev on the occasion of the assimilation of the new facilities for producing mineral fertilizers.

We are continuing to put highly-automated complexes fitted out with modern equipment into operation. Planned capacity of yet another, a seventh nitric production unit, which went into operation at the beginning of the year, was reached ahead of schedule. Since it started up, 2,000 tons of nitric acid in excess of the plan have been produced. This is enough to produce almost 3,000 tons of mineral fertilizers.

How are the Novomoskovsk chemists proceeding toward achieving planned capacities ahead of schedule and increasing them? The association's machinery and repair service has played an important role in this. The creation of centralized repair shops makes it immediately possible, in technological facilities, to solve the problems of mechanizing labor-intensive processes and to efficiently organize the reconstruction and modernization of equipment and the reassembly of technological systems.

The association maintains contacts with most chemical equipment manufacturing plants (Uralkhimmash, Penzkhimmash, Uzbekkhimmash), and it keeps track of its manufacture times, the degree of conformity with stipulated technical conditions, and the quality of equipment. As a result, during the process of assembly, the struggle is already being waged at literally every stage to shorten times, to comply with and improve technology and quality of work.

The collective of experts on efficiency, integrated creative brigades, and engineering and technical personnel from shops and from the association's technical department determined the capabilities of the installed machinery at the beginning stage of its operation, then went on to devise a set of measures to increase its capacity.

We Are Lowering Expenditure Norms

Lowering the prime cost is one source of increased efficiency. Bearing in mind that in the prime cost of our production, outlays of raw material, stock, and electrical and heat energy make up more than two thirds of all expenses, we gave special attention to discovering reserves for further lowering expenditure norms against those which were planned and specified. Initiators of competition were collectives from the ammonia and methanol producing facility, and from the second-phase carbamide shop and polyvinyl-chloride resin shop. They pledged themselves to lower the prime rate of production by a yearly average of 1.5 million, 260,000, and 575,000 rubles, respectively, by curtailing expenditure norms.

Plant management specialists and shop engineering and technical personnel made a thorough study and analysis of each facility's degree of accomplishment of planned and specified norms. It turned out that, out of 560 expenditure norms, 20 percent were higher than projected. Again, we were able to find out that the operation was not making use of considerable reserves of economizing and surplus production output.

Hundreds of suggestions, recommendations, and practical advice for improved norm-setting were collected. In order to handle specific tasks of lowering expenditure of material and energy resources, the enterprise created integrated

brigades, including highly-qualified workers and engineering-technical personnel, who are doing successful work.

An important organizational measure for finding reserves of production has been to produce unified, integrated plans of shops' functioning, instead of the earlier existing multitude of plans for new technology, the scientific organization of labor, the mechanization of labor, the modernization of equipment, and so on. Now each expenditure norm is analyzed from this point of view: whether it exceeds technically sound-boundaries, where the difference between theoretical and actual expenditure is lost.

The movement to lower expenditure norms is paying off. The collective's systematic work has made it possible to lower, from one year to the next, the expenses per ruble of commodity output; the overall savings of raw materials, stock, and energy resources has come to more than two million rubles in the past three years alone, and has exceeded 13 million since the initiative was put into practice.

Our Suggestions

One would like, too, to raise a few sore issues on the pages of the EKONOMICHESKAYA GAZEYA. One of them is the uneven supply of natural gas. I realize the inherent difficulties in this endeavor, but I believe that with a careful approach to the matter, a way can be found. I will explain in a few examples. If one of the machines is stopped for an overhaul (which takes, as a rule, 30 days), then, having at our disposal the raw materials supplied to us, we can keep the remaining machines going at full capacity. But while this is going on, we ask the supplier organizations and ministry services to see to it that surplus gas is sent to neighboring enterprises--to Shchekino, Voskresensk, or else put into state storehouses.

However, we get the reply: "Take that which has been allocated to you." In other words, they tell us to keep on using the former average daily amount of gas. But when the machinery has been repaired, we ask them to increase our supplies of raw material, to give us back the unused portion. Then all the complexes of the Novomoskovsk Association would work at full capacity. But they continue to give us the average daily amount, as before. Yet the ministry plans overhauls a year before in advance.

New large-tonnage complexes, so-called big machinery, when operating at full capacity make it possible to obtain ammonia significantly more cheaply than that produced by the old traditional systems, by using the heat of reaction. However, as a result of the uneven supply of gas, they sometimes work at a level of 70 percent of projected capacity.

In practice, situations often arise where newly built shops do not get underway for years on end. A perfect example of this is the production of weak nitric acid in machines under a pressure of 7.3 atmospheres with a capacity of 120,000 tons per year, which are functioning at many plants in the country. At the beginning of the 1970s, serious design defects were detected, on account of which the actual time of assimilation often exceeded

the normative by a factor of two-to-three. Our current level of utilization of average yearly capacity, for example, comes to 85 percent. These machines need serious modification, but they continue to be designed and constructed. Actual capacity does not coincide with the projected capacity. The consuming shops are suffering from this--in our case, a large-tonnage machine for producing ammonium nitrate which has to be operated at a reduced workload.

Now it is up to the Moscow and Dneprodzerzhinsk institutes of the State Scientific-Research and Design Institute of the Nitrogen Industry and Products of Organic Synthesis, and the corresponding technical services of the Ministry of Chemical Industry.

Specialists of the association are working in cooperation with scientists to create a new type of high-concentration fertilizers, the increased production of which was discussed at the May Plenum of the CPSU Central Committee. The first few thousand tons of it are undergoing field testing for effectiveness at the Novomoskovskiy Rayon Kolkhoz imeni V. I. Lenin.

Tula Oblast.

12255

CSO: 1841/87

AZOT ASSOCIATION STARTS UP NEW ARGON FACILITY

Moscow EKONOMICHESKAYA GAZETA in Russian No 47, Nov 82 p 8

[Unattributed, untitled article]

[Text] A large facility for producing argon has gone into operation in the Severodonetsk Azot Association in Voroshilovgrad Oblast. By-products of ammonia production are serving as the raw materials. It will produce about 8,000 cubic meters of liquefied gas per day.

12255

CSO: 1841/87

OVERHAUL POTENTIAL FOR MINERAL FERTILIZER PLANTS: ANALYSIS AND PLANNING

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 11, Nov 82 pp 692-697

ZALEVSKIY, A. A. and MINTS, Ya. I.

[Abstract] One of the key problems of the mineral fertilizer branch of the chemical industry is that of equipment maintenance and overhaul of plants. Since plants are being built close to fertilizer users, new problems emerge for repair. The present article discusses important issues in this area, with emphasis on evaluation of the composition and content of basic industrial production reserves (BIPR). The relatively high input needs of fertilizer production include acquisition and enrichment of ores, production of intermediate products such as sulfuric, phosphoric and nitric acids and synthetic ammonia, and various stages of processing before final products, which may be solids or liquids. The authors offer calculations of the role of equipment amortization and maintenance for all of these steps in production, using the example of the "Minudobreniye" Production Association. Difficulties relate to shortages in equipment and spare parts, including valves, armatures, cables, bearings and heat exchangers. Overhaul potential is presented as the relationship of repair costs to the value or volume of finished product. These costs have risen by 16.6% at the illustrative plant over a period of some 15 years (1966-1980). The authors stress the importance of planning and improved regular maintenance as a way to reduce the frequency and cost of general overhauls. Personnel competency and accurate parameters are also highlighted. Figures 3; references 5 (Russian).
[82-12131]

FREE RADICALS

UDC 541.124.13

REACTION OF CH_3 RADICALS WITH OXYGEN

Moscow KHIMICHESKAYA FIZIKA in Russian No 11, Nov 82
(manuscript received 15 Jun 82) pp 1565-1567

BORISOV, A. A., DRAGALOVA, Ye. V., ZAMANSKIY, V. M., LISYANSKIY, V. V.
and SKACHKOV, G. I., Institute of Chemical Physics, USSR Academy of Sciences,
Moscow

[Abstract] Reaction of methyl radicals with O_2 is an important stage in the mechanism of oxidation of hydrocarbons. Because data in literature are controversial, an attempt was made to identify various possible channels of the interaction of CH_3 with O_2 by oxidizing methane in presence of O_2 and N_2O in a temperature interval of 880-1670 K. It was shown that the assumption made in previous studies, that reactions $\text{CH}_3 + \text{O}_2 \rightarrow \text{CH}_3\text{O}_2$ and $\text{CH}_3 + \text{O}_2 \rightarrow \text{CH}_3\text{O} + \text{O}$ play an important role in this reaction, was incorrect since the experimental data on the ignition of $\text{CH}_4\text{-O}_2\text{-N}_2\text{O}$ mixtures could not be explained by them. The principal reaction for oxidation of CH_3 is $\text{CH}_3 + \text{O}_2 \rightarrow \text{CH}_2\text{O} + \text{OH}$. References 12: 7 Russian, 5 Western.
[71-7813]

NITROGEN COMPOUNDS

UDC 547.23.236+543.42

STRUCTURE AND REACTIVITY OF ALIPHATIC AZIDE COMPOUNDS, PART 13: ELECTRON ABSORPTION SPECTRA OF ALKYL AZIDES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 10, Oct 82
(manuscript received 9 Dec 81) pp 2068-2070

ZACHESLAVSKIY, S. A., KARAULOVA, I. B. and MEL'NIKOV, V. V., Leningrad
Institute of the Textile and Light Industry imeni S. M. Kirov

[Abstract] Analysis of electron spectra of azidopentane, 2-hydroxy-, 2-nitro- and 2-nitroso-1-azidoethanes by the "complete neglect of differential overlap" method (CNDO/S) revealed three electron transitions: $\lambda_{\max}^1 \sim 280$ nm ($^1A''$), $\lambda_{\max}^2 \sim 220$ nm ($^1A'$) and $\lambda_{\max}^3 \sim 190$ nm ($^1A''$). ONO_2 and NO_2 groups had a minimal effect on azide group frequencies. References 17: 8 Russian, 9 Western.

[70-9307]

UDC 547.841+547.495

SYNTHESIS AND REACTIONS OF 5,6-DIHYDRO-1,4-DIOXIN-2-CARBONYLSISOTHIOCYANATE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 10, Oct 82
(manuscript received 30 Dec 81) pp 2197-2200

KRASAVTSEV, I. I. and LOZINSKIY, M. O., Institute of Organic Chemistry,
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[Abstract] 5,6-Dihydro-1,4-dioxin-2-carbonylisothiocyanate (I) was obtained by reacting the acid chloride of 5,6-dihydro-1,4-dioxin-2-carbonic acid with potassium isothiocyanate. The resulting isothiocyanate (I) was a highly reactive compound, yielding thioureas when reacted with aromatic and aliphatic amines, carbamates when reacted with methanol with sodium methylate or triethylamine as catalysts, and corresponding acid amides upon hydrolysis. The thiocyanate (I) reacted as readily with phenylhydrazine and semicarbazide. IR spectra of these compounds are discussed. Dioxane isothiocyanates may be

of value in the synthesis of biologically active substances. References 5:
2 Russian, 3 Western.
[70-9307]

UDC 547.543.42

SPECTROPHOTOMETRIC ASSAY OF HIGH MOLECULAR 2,4-DIALKOXY-6-CHLORO-symm-
TRIAZINES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA
TEKHOLOGIYA in Russian Vol 25, No 10, Oct 82 (manuscript received 11 May 81)
pp 1196-1197

PEROV, P. A., GERASIMOVA, N. T., KUDRYASHOV, P. A. and SOKOVA, N. A.,
Department of Organic and Petrochemistry, Moscow Institute of Petrochemical
and Gas Industry imeni I. M. Gubkin

[Abstract] Products of substitution of two chlorine atoms in 2,4,6-trichloro-
symm-triazine by higher alkoxy groups can be used as the basis for synthesizing
antioxidants, ultraviolet stabilizers and surface active substances. For
the subsequent syntheses, it is not necessary to isolate the intermediate
(title) triazines but it is necessary to assay their quantitatively in the
reaction mixture. The spectrophotometric assay was run on a mixture wherein
unreacted alcohol, trialkoxy-substituted and hydroxy-substituted additives
were present. The absence of cyanurochloride and derivative monoalkoxys
was confirmed by thin layer chromatography, and infrared spectra established
compositions. Molar coefficients of extinction were determined on the basis
of 2,4-didodecyloxy (and dihexadecyloxy)-6-chloro-symm-triazines; for the
title compounds that value was 2720 l/(mol·cm). Figures 2; references 2:
1 Russian, 1 Western.
[84-12131]

UDC 547.733.491.3.495.1.2

SYNTHESIS AND CERTAIN PROPERTIES OF SULFOLENE-2-YL-4-ISOCYANATE

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 48, No 11, Nov 82
(manuscript received 18 May 81) pp 1217-1220

PARKHOMENKO, P. I., BEZMEANOVA, T. E., RYBAKOVA, M. V. and LUKASHOVA, S. M.,
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[Abstract] Isocyanates with SO₂ groups are used to make carbamates, ureas,
amides and other compounds. Sulfolenylisocyanates had not previously been
described; the authors present data on synthesis and properties of the title
compound, also described as 4-isocyanatosulfolene-2, produced from 4-amino-
sulfolene-2 by the reaction of 4-arylsulfonatosulfolene-2 or 4-bromosulfolene-2

with aqueous ammonia. Avoiding secondary reaction, the title compound was obtained through phosgenation of the chlorohydrate of 4-aminosulfolene-2, in nitrobenzene at 125-135° C. PMR and infrared spectra were used to confirm structure. The compound dissolved readily in acetone, nitrobenzene and chloroform, less well in benzene, chlorobenzene and ethyl ether, and hardly at all in hexane, heptane or other aliphatic hydrocarbons. It was used to produce new urethanes, thiourethanes, ureas and amides. Chemical procedures are summarized. Figures 1; references 8: 4 Russian, 4 Western. [89-12131]

ORGANOMETALLIC COMPOUNDS

UDC 547.823+547.818.1

STEREOCHEMISTRY OF REACTION BETWEEN 3-HYDROXY-4-PIPERIDONES AND ORGANOMETALLIC COMPOUNDS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 18, No 10, Oct 82
(manuscript received 31 Mar 81) pp 2108-2114

ZVONOK, A. M., LUGOVSKIY, A. P., MASHENKOV, V. A. and STANISHEVSKIY, L. S.,
Belorussian State University imeni V. I. Lenin

[Abstract] The reaction of stereoisomers of 3-hydroxy-4-piperidones with sodium acetylenide, methyl lithium and methyl, ethyl and ethynylmagnesium halides produced 4-alkyl- and 4-ethynyl-substituted 3,4-dihydroxy-1,3-dimethyl-6-phenylpiperidines and 3,4-dihydroxy-1-benzyl-3-methyl-6-phenylpiperidines. Stereochemistry of compounds was determined by IR, PMR and mass spectroscopy and thin-layer chromatography. The quantitative ratio of diastereomers of 3,4-dihydroxypiperidines was determined by apparent reagent volume, configuration of the carbinol center and the substituent at the nitrogen atom of the initial piperidone. Transformation of 3-hydroxy-4-piperidones into their trimethylsilyl ethers altered the stereochemical course of the reaction. Pyrrolidones were obtained by reacting piperidones with methylmagnesium iodide. References 9: 4 Russian, 5 Western.
[70-9307]

UDC 547.451

PROGRESS IN CHEMISTRY OF 1,3,2-DIHETEROPHOSPHOR(III)INANES

Moscow USPEKHI KHIMII in Russian Vol 51, No 10, Oct 82 pp 1601-1637

NIFANT'YEV, E. Ye. and ZAVALISHINA, A. I., Chemistry Faculty of Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] This is a review-type article addressing synthesis and reactivity of 1,3,2-diheterophosphorinanes (PDHP), six membered heterocyclic compounds containing a trivalent phosphorus atom surrounded by two other heteroatoms. The subject is divided into a section on monocyclic and polycyclic PDHP each. The latter group is further subdivided into isolated ring PHDP, spirane bis-diheterophosphorinanes and condensed PDHP. It was concluded that currently a number of simple synthetic methods exists for production of PDHP. They were found to be valuable reagents in studying their reactivity, in studies of the effect of various substituents connected to the trivalent phosphorus and in studies of other problems in organophosphorus chemistry. References 338: 169 Russian, 169 Western (8 by Russian authors).
[73-7813]

PETROLEUM PROCESSING TECHNOLOGY

NEW OIL AND GAS DRILLING REAGENTS DEVELOPED

Kiev PRAVDA UKRAINY in Russian 17 Oct 82 p 2

[Article by Docent, Candidate of Technical Sciences R. Yaremiychuk, pro-rector of the Ivano-Frankovsk Institute of Petroleum and Gas, under the rubric "Nominated for the Ukrainian State Prize": "Chemists Are Helping Drillers"]

[Text] The intensive development of the country's fuel-energy base planned by the 26th CPSU Congress has necessitated careful evaluation and quick industrial exploitation of promising oil and gas deposits in the Northern Urals, Western and Eastern Siberia, Komi ASSR, polar regions, and Central Asia.

Searches are being made at great depths, where complex mining-geological conditions are often encountered, and where high temperature and pressure frequently exist. This necessitates special processing of drilling muds by chemical reagents. This cannot proceed without better materials to reinforce the walls of the bore-hole.

Today, the drilling of just one hole consumes up to 500 tons of various chemical substances. Therefore, providing the mining industry with highly effective reagents is a truly crucial problem. It has been necessary to create and study the properties of a new series of organic silicon dioxides--highly dispersed solids with an increased degree of water-repellence. A complex of projects of this sort was carried out by scientists at the Institute of Physical Chemistry imeni L. V. Pisarzhevskiy of the Ukrainian SSR Academy of Sciences and the State Scientific Research and Project-Planning Institute of Petroleum Industry.

Basically new data has made it possible to effectively carry out chemical conversions on the surface of dispersed solids and thereby to obtain material with the desired properties. Especially important are their high capacity to repel water, their thermal resistance and stability during prolonged work in saline solutions, where the pressure is still high.

Methods have been worked out for synthesizing organosilica. Production line machinery and equipment have been created. The new technology enables us to obtain the organosilica with various concentrations of chemically grafted organosilicon compounds.

Authors have compiled technical and technological documentation for obtaining and using the reagents. Production has been organized for the reagents which have been given the commercial designations MAS-200, MAS-ST, AM-5, and AM-5M. The first of these is widely used as the main component of a foam suppressor of drilling muds on a water base. The second reagent is intended for stabilizing drilling muds on a hydrocarbon base. Reagents of type AM-5 are used for combined action on drilling muds.

The new reagents eliminate harmful impact of petroleum and petroleum products on the environment. The preparations have passed industrial tests and are being used in drilling shafts in all of the country's climate zones. The first to assimilate the new substances were the production associations Ukrneft', Belarus'neft', Komineft', Embaneft', and others, and also the Kalushskaya, Stryyskaya, and Samborskaya deep-drilling oil and gas exploration expeditions. At present, more than 60 enterprises are using this product. The new reagents are also manifesting high qualities in geological prospecting for minerals.

The economic effect of introducing the new class of reagents has exceeded 20 million rubles in recent years.

The reagents are being exhibited at republic, all-union, and international fairs, and have been awarded silver medals from the USSR's VDNKh. Five republic and all-union conferences have been held on the new materials. Fifteen authors' certificates have patented scientific research, and technological work are of the USSR. The scientists' great work, "Razrabotka novogo klassa reagentov dlya neftegazodobyvayushchey promyshlennosti, organizatsiya ikh proizvodstva i shirokoye vnedreniye" [The Development of a New Class of Reagents For the Oil- and Gas-Producing Industry; Organizing Their Production and Broad Introduction] has justifiably been nominated for the Ukrainian SSR State Prize in the area of science and technology.

12255
CSO: 1841/87

UDC 621.513

NOVEL OPPOSED COMPRESSORS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 11, Nov 82
pp 7-8

Candidate of Technical Sciences BELEN'KIY, A. A., Engineers BADAMYAN, A. A.,
GRIBOV, Yu. M. and LEPEKHA, A. I.

[Abstract] Moscow compressor plant "BORETS" is the principal producer of stationary opposed compressors of medium capacity, such as those shown on the cover of this issue. The new compressors have the following advantages over those of previous generations: smaller requirements on metal, highly economical regulation system for compressor shaft rotation rate, high dynamic stability, smaller mass of the support base, low noise and vibration levels, highly effective gas coolers, automatic emergency controls and simple service. The plants have produced only prototypes so far; they are gearing up to serial production which should begin in 1983. No references.
[72-7813]

UDC 678.053.3 678.743.22

REPROCESSING OF HIGHLY IMPREGNATED POLYVINYLCHLORIDE IN TWO-SCREW MIXERS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 11, Nov 82
pp 14-17

Engineer LAUKHIN, V. Ya.

[Abstract] Two-screw mixers of the SN type have been used effectively in mixing, devulcanization, polymerization, dispersion and other operations. Producers of linoleum and tiles made of polyvinylchloride (PVC) were interested in a mixing-plasticizing machine which, along with productivity would assure also high quality of the product and acceptable working conditions. The SN type mixer seemed to fulfill these requirements. Actually, laboratory and plant tests of the SN mixer showed that the tiles and linoleum produced from PVC were of high quality. It was concluded that these two-screw

mixers will contribute to high productivity and improved quality of the material. Figures 3; references 4 (Russian).
[72-7813]

UDC [547.51 + .514]:665.613

DISTRIBUTION CHARACTERISTICS OF POLYCYCLIC RELICT HYDROCARBONS IN CRUDE OILS OF TATARIA

Moscow NEFTEKHIMIYA in Russian Vol 22, No 5, Sep-Oct 82
(manuscript received 7 Apr 80) pp 579-586

KAYUKOVA, G. P., PUSTIL'NIKOVA, S. D., AREF'YEV, O. A., KURBSKIY, G. P. and PETROV, Al. A., Institute of Geology and Processing of Fuel Minerals

[Abstract] Studies of relict hydrocarbons at the molecular level have theoretical and practical importance in solving various geochemical problems connected with transformations of crude oil under natural conditions. An in-depth study of Tataria deposits of crude oil was carried out using saturated hydrocarbons with b.p. above 400°C. Tetra- and pentacyclic hydrocarbon concentrates were obtained by Al_2O_3 chromatography. Gas chromatographic-mass spectral analysis gave qualitative and quantitative identification of individual fractions. The crude oil contained high levels of sulfur compounds, tarry-asphaltous material and solid paraffins. Regardless of their geological age, depth of deposits or physical-chemical properties, these crude oils showed analogous distribution of C_{27} - C_{29} steranes and C_{27} - C_{33} hopanes. Thermal cracking of the asphaltenes from Boviinsk and Mordovo-Karmal'sk oil yielded normal and isoprenoid alkanes, steranes and triterpanes resembling the composition of nonbiodegraded crude oil, thus supporting genetic unity of crude oils of Tataria. In general, these deposits appeared to be of the hopane type with low concentration of steranes. Figures 2; references 15: 8 Russian, 7 Western.
[74-7813]

UDC 547.592.1:542.952.1:542.971.3

ISOMERIZATION OF THIACYCLOHEXANE ON HETEROGENIC ACID CATALYSTS

Moscow NEFTEKHIMIYA in Russian Vol 22, No 5, Sep-Oct 82
(manuscript received 17 Aug 81) pp 689-692

YUS'KOVICH, A. K., DANILOVA, T. A. and VIKTOROVA, Ye. A., Moscow State University imeni M. V. Lomonosov

[Abstract] One of the practical uses of thiacyclohexane and its homologs present in Soviet petroleum, is their conversion to derivatives of

thiacyclopentane and thiophene. Conversion employs heterogenic acid catalysts based on γ -aluminum oxide, used after being calcined at different temperatures or after modification with zinc chloride. In contact with all catalysts, thiacyclohexane converted to 2-methylthiacyclopentane, which dehydrated to 2-methylthiophene. The yield of isomerization products increased with acidity of the contact and with temperature of the experiment. This method was found to be very simple. The materials are cheap and easily obtainable, the process can be easily controlled and the formation of byproducts is low, so that this method can be highly recommended for preparation of 2-methylthiacyclopentane and thiophenes. Figures 1; references 10: 8 Russian, 2 Western.
[74-7813]

UDC 665.6:547.73:542.941-128

IONIC HYDROGENATION OF THIOPHENES OF PETROLEUM ORIGIN

Moscow NEFTEKHIMIYA in Russian Vol 22, No 5, Sep-Oct 82
(manuscript received 11 Aug 81) pp 693-696

LYAPINA, N. K., PARNES, Z. N., TOLSTIKOV, G. A., PARFENOVA, M. A. and SHMAKOV, V. S., Institute of Chemistry, Bashkir Branch of the USSR Academy of Sciences

[Abstract] The goal of the present study was to investigate conditions for the conversion of thiophene concentrates, obtained from petroleum distillates, to respective thiacyclanes by the ionic hydrogenation method. In contrast to ionic hydrogenation of individual thiophenes, hydrogenation of complex mixtures of natural thiophenes had to be carried out under external cooling (at -5 to -10°C), otherwise considerable tarring would occur. Optimal reaction time was 2 hrs. The hydrogenation rate of the mixtures was about the same as that of individual thiophenes. Benzothiophenes yielded thiaindanes at a lower conversion rate than alkyl- or cycloalkylthiophenes. The principal byproducts of the hydrogenation of petroleum condensates are thiamono- and thiabicycloalkanes. References 11 (Russian).
[74-7813]

SYNTHESIS AND INVESTIGATION OF SOME METHYL-2-HYDROXYPHENYLTHIOACETOAMIDES USED AS ADDITIVES TO LUBRICATING OILS

Moscow NEFTEKHIMIYA in Russian Vol 22, No 5, Sep-Oct 82
(manuscript received 13 Jul 81) pp 709-711

KULIYEV, A. B., ANAVE, P. A. L., KULIYEV, F. A. and MAMEDOVA, Sh. E.,
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[Abstract] Searching for new effective additives to lubricating oils, a series of methyl-2-hydroxyphenylthioacetoamides was synthesized by the Willgerodt-Kindler reaction of methyl-2-hydroxyacetophenones with sulfur and various amines. These reaction products were found to have excellent anti-corrosive and wear-resistant properties which did not depend on individual compound structures, except that presence of a hydroxyl group in phenylthioacetoamides led to a drop in formation of precipitates and to increased viscosity. References 4 (Russian).
[74-7813]

UDC 665.6:665.61.03

USE OF FLUE GAS HEAT FOR REGENERATING CRACKING CATALYSTS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 11, Nov 82
pp 18-19

LEVITSKIY, E. A., KOLOMIYTSEV, Yu. V., BOGDANOV, A. I., LEVASHOVA, T. M.,
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Academy of Sciences

[Abstract] Foreign and domestic (Soviet) methods of using flue gas heat involve convection boilers that have certain deficiencies. In the present study, the authors examined the feasibility of an "afterburner" to utilize flue gas heat and complete the oxidation of CO. The device features a fluidization layer of oxidizing catalyst that is the location of heat exchange for generation and reheating of vapor. Flue gas provides the necessary heat energy for the device. The catalyst tested was an aluminum oxide carrier with metal oxides of varying valency applied by steeping from solution. Parameters studied were mechanical durability, kinetic features and firing temperatures. Granular dimensions of the catalysts were found to be important for maintaining quality in fluidization and an optimal gas rate in the device. After laboratory tests, pilot industrial applications were studied. These tests showed that the device, which is diagrammed and described, could achieve significant savings while eliminating torching in boilers, thus avoiding nitrogen oxide emissions into the atmosphere.
Figures 1.
[91-12131]

OPTIMUM CONDITIONS FOR OBTAINING VERBAN-274 ADDITIVE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, Nov 82
pp 24-25

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Chemistry, People's Republic of Bulgaria

[Abstract] Dialkyldithiophosphates of metals are known as additives that improve antioxidational and anticorrosion properties of lubricants, polymers and benzines. This fact has promoted both constant interest in them and the need to define certain technical parameters more closely, such as processing temperature, P_2S_5 dispersion, mixing method and metal impurities. Study of these problems revealed that impurities in Verban-274 such as mercaptans, sulfides, thio-derivatives of meta- and pyrophosphoric acids, etc., caused instability and lower pH values. Optimum temperature for processing was sought by studying the reaction of P_2S_5 with a mixture of isobutanol and isooctanol at 65-70° and 95-100° C. At the lower range acid numbers rose slowly (taking 90 minutes), and secondary decomposition processes did not occur. At 95-100° C, formation of dithiophosphoric acid was quicker, being complete in 35-40 minutes. Under pilot plant conditions with propeller and planetary mixing apparatus, it was determined that the nature of mixing equipment was important, with best results when the propeller apparatus was employed. It was also determined that synthesis of Verban-274 should be conducted in enameled or lead-coated reactors or ones of stainless or acid-resistant steel, at temperatures of 90-100° C followed by rapid cooling. Figures 2; references 15: 10 Russian, 1 Bulgarian, 4 Western.
[91-12131]

UDC 615.2:547.794.3].012.1

BIOLOGICALLY-ACTIVE COMPOUNDS IN THE 1,2,5-THIADIAZOLE SERIES AND ITS
CONDENSED SYSTEMS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 16, No 11, Nov 82
(manuscript received 31 Dec 81) pp 1311-1318

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[Abstract] The title substances have been studied for 20 years as medications. Products based on them are effective on the central nervous system and on organs affected by vegetative nerves, e.g., kidneys and metabolic tissue. Effective preparations against microbes, parasites and tumors have also been developed. The present article summarizes and systematizes these research advances. Compounds affecting the central nervous system include hydrazides of 1,2,5-thiadiazole-3-carboxylic acid, the salt of that acid and beta-phenylisopropylamine and 4- and 5-imidazoliny-2-amino)benzo-2,1,3-thiadiazoles. Substances effective on organs include several derivatives of 1,2,5-thiadiazole, beta-adrenoblockers, furoxano- and furazano-benzo-2,1,3-thiadiazoles, etc. Substances effective against radiation sickness include several derivatives of benzo-2,1,3-thiadiazole. Bactericides include derivatives of 1,2,5-thiadiazole and its condensed systems, 2-substituted-1,2,5-thiadiazol-3-ones and (most effective) sulfamide derivatives. Antimicrobial action has been found in (1,3-dithiolo[4,5-v][1,2,5]-thiadiazolo(3',4'-e) pyrazinilidene-6)propandinitrile; while benzo-2,1,3-thiadiazole and its 5-methyl derivative aid in treating skin ailments, 3-1,2,5-thiadiazolyl-2-benzylidazolylketone and derivatives have antihelminthic activity and several substituted benzo-2,1,3-thiadiazoles have antiviral value. References 93: 18 Russian, 75 Western.
[85-12131]

POLYMERS AND POLYMERIZATION

BASIC BOOK ON METAL-POLYMER SYSTEMS PUBLISHED

Moscow METALLOPOLIMERNYYE SYSTEMY (NOVOYE V ZHIZNI, NAUKE, TEKHNIKE: SERIYA "KHIMIYA") in Russian No 11, Nov 82 (signed to press 29 Oct 82) pp 2-5, 58-60, 64

[Annotation, table of contents, introduction, conclusion and bibliography from book "Metal-Containing Polymer Systems (Advances in Life, Science, Technology: 'Chemistry' Series", by Vladimir Alekseyevich Belyy and Yuriy Mikhaylovich Pleskachevskiy, Izdatel'stvo "Znaniye", 28,490 copies, 64 pages]

[Text] This short book describes the principles of creating metal-containing polymer systems and their properties from the standpoint of the needs of technology and production, and it describes the most important effects of their contact interaction.

The book is intended for a broad range of specialists involved in the development, analysis and use of metal-containing polymers and for all persons interested in this area of knowledge.

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Introduction

Materials have always played a certain role in the life of man. Thus it is no accident that the ages of mankind's development have always been associated with the principal material from which the implements of production were manufactured: the Stone Age, the Bronze Age and the Iron Age.

The time in which we live is now being referred to more and more frequently as the polymer age. And it is no accident, since in the last few decades various materials and articles made from polymers have been confidently penetrating into all industrial sectors and into all spheres of human life.

In the future, polymer chemistry will enjoy even greater development. Among the most important tasks posed by the "Basic Directions of the USSR's Economic and Social Development in 1981-1985 and in the Period to 1990," chemical and petrochemical industry was given that job of "developing production of high-quality polymers with prescribed technical characteristics, to include reinforced and filled plastics...."*

The first experience of using polymers showed that when a transition is made to polymer articles, labor productivity rose by several times. The reason for this is that polymer articles, even ones of rather complex shape, can often be manufactured by a single production operation: injection molding, compression molding, extrusion and drop forging. Moreover all of this is now being done more and more frequently without subsequent mechanical working.

Because of the continuing search for new materials associated with equipment planning and production, many of the parts, units and structures of machines, mechanisms and various structures that had formerly been manufactured from metal are now being made from polymers. This trend was most typical of the 1950s and the early 1960s. This produced a significant economic impact in production. The users of such equipment, meanwhile, turned their attention rather quickly to the extremely strange phenomena occurring in articles made from polymers: With time, micrometer screws changed their thread spacing by some incomprehensible law, body parts coming in contact with oil began to warp, polymer axles changed their shape in response to a load even at normal temperature, film stretched evenly over the light openings of hothouses sagged on the next day, polymer bushings in friction units melted in response to an insignificant rise in the rotation speed of a metal shaft, and "clearly plastic" polymers behaved like glass in response to a load sharply applied. Thus there arose a psychological barrier in the consciousness of engineers and designers owing to a certain discrediting of polymers as structural and machine-building materials.

Scientists had to labor a great deal to put everything back in order. They proved that all of the mysterious processes that were occurring with polymers stemmed from the unique features of their properties, and that blind copying of metallic parts and structures without regard to these properties would not produce the desired results. And in fact, some polymers exhibit relatively low strength and heat resistance, high diffusional permeability and complex behavior in the presence of external factors. But unique valuable qualities are also inherent to all of them: low specific weight, good corrosion resistance

* "Osnovnyye napravleniya ekonomicheskogo i sotsial'nogo razvitiya SSSR na 1981-1985 gody i na period do 1990 goda" [Basic Directions of USSR's Economic and Social Development in 1981-1985 and in the Period to 1990] Moscow, Politizdat, 1981, p 31.

and shock-absorbing capability, low coefficient of friction, low electrical conductivity etc.

Specially created compounds made it possible to break down the psychological barrier that restricted the thinking of engineers and designers attempting to select polymers as structural and machine-building materials. Among them, metal-containing polymer systems which combine the positive properties of both metals and polymers play an important role.

The short book offered for the reader's attention here is a first attempt at briefly and systematically presenting the theoretical and practical results associated with metal-containing polymer systems.

The authors believe that acquaintance with the original works indicated in the bibliography will provide the reader with greater detail on the subject and deepen his knowledge of it.

Because this book was written as a work of popular science, the described phenomena and laws were simplified and abbreviated somewhat, for which the authors extend their apologies to specialists.

Conclusion

Despite their "youth," metal-containing polymer systems have assumed a confident stance in the world of construction materials and machine building parts and units used to manufacture modern equipment. In a number of cases it was only owing to the use of metal-containing polymer systems that creation of specific articles for motor vehicle, machine tool building, chemical, aviation, rocket and other industrial sectors became possible. The "launching pad" for penetration of metal-containing polymers systems into technology now consists of the results of fundamental theoretical and experimental research in the mechanics of metal-containing polymer systems. As our knowledge of the laws governing formation and breakdown of metal-containing systems and of their properties has grown in detail and depth and because the needs of modernizing and increasing the complexity of equipment have grown, theoretical mechanics can no longer deal with all of the problems associated with metal-containing systems. New scientific directions are being born before our eyes in materials science: physical chemistry, optics, tribonics, thermal physics and the rheophysics of metal-containing polymers systems. The need for learning the chemistry of polymer-metal interaction and increasingly broader utilization of the chemical principles of their combination are bringing the chemistry of metal-polymers systems into being.

Further progress in the area of metal-containing polymer systems will be predetermined by the successes in synthesis and industrial assimilation of new high-strength, heat-resistant and long-lasting polymers, development of new principles of combining a metal and a polymer with maximal utilization of the properties of the components, penetration into the secrets of the interaction of polymer and metal in different aggregate states and creation of physically grounded calculation schemes and models of this interaction. Various self-adjusting and self-tuning (adaptive) metal-containing polymer systems, which when combined with a cybernetic brain will become the body of fantastic systems of the future, are the promise of tomorrow's technology.

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11004

CSO: 1841/88

RESERVES IN ULTRASONIC POLYMER WELDING DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Nov 82 p 2

[Article by Yu. Kholopov, doctor of technical sciences, laboratory director of VNIIESO, and S. Volkov, docent of MVTU imeni Bauman: "Possibilities in Ultrasonics"]

[Text] The ability of ultrasonics to weld polymers was discovered in our country 20 years ago and received practical application largely due to the work of scientists of the MVTU [Moscow Higher Technical School] imeni Bauman under the leadership of Academician G. Nikolayev. The research and development they carried out made it possible for the first time in world practice to create an essentially new technology and the corresponding equipment. Institutes of many fields became connected with the work in an opportune fashion. And the new welding method found application almost immediately in very different enterprises.

Inasmuch as the innovation did not have to struggle through a multitude of barriers, this is nothing surprising. We are putting out thermoplastic products by the millions of tons. And it is profitable to make a good half of them by means of ultrasonic welding. It is not necessary to make special preparations for this, nor to purify the surfaces to be welded, and the actual source of the ultrasonic waves can be placed at a distance from the components to be welded. But this does not prevent it from welding the polymers, cutting them, and pressing metal fittings into them. Furthermore, it turns out that only ultrasonics can weld such polymers as, for example, lavsan and polystyrene. It can also weld the most "capricious" of the light metals--aluminum, copper, and nickel.

The unique capabilities of the new technology have been clearly demonstrated by the example of welding-knit lavsan hose, from which filters for blood transfusion are made. The severest demands are made on these: lavsan, in particular, must be welded so that no fibers remain in it--they can cause blood clots to form in the blood vessels. Not one of the familiar methods, including glue bonding, [leivaniy], guaranteed the necessary surface smoothness. Only ultrasonics has enabled staff members of VNIIESO [All-Union Scientific-Research Institute of Electronic Welding Equipment] and the All-Union Scientific-Research Institute of Medical Polymers to solve the problem.

The Ministry of Electrical Equipment Industry was quick to appreciate the advantages of ultrasonic fusion. Specialized laboratories were created in VNIIESO. Staff members there conducted comprehensive research jointly with MVTU and other scientific collectives, the results of which made it possible to organize the production of welding machines at the Kaliningrad Elektrosvarka Plant.

One might ask, what more is needed? The technology is worked out, the machines are being produced and are gaining wider and wider use in industry. And only the specialists are aware that all this happiness is short-lived.

The same history accompanies ultrasonic polymer welding which in principle lies in wait for every fundamental innovation. The initial period of bringing it under control, when one can "skim the cream" off of advanced technology, has already passed. The introduction of batch production machinery has become a routine matter. And the effect it has is putting enterprises into fine shape. But researchers and developers have discovered that under the external, easily accessible layer lies another layer of possibilities, more promising and with much greater potential. But now it turns out that these future possibilities...do not interest anyone very much.

Of course, if it were a matter of ready-made fully automated welding lines, functioning without the direct participation of people, hardly anyone would refuse them. But these lines have yet to be created; it is necessary to work out the scientific bases and design, and to install electronic control, powerful radiation sources, and transport mechanisms. Such a task is not in the power of a single sector. It is necessary to have the combined efforts of specialists, organizations, and enterprises of different departments. And one of the necessary conditions is a coordinating center, channeling all efforts into a unified technical policy.

Theoretically, such a center exists: the functions of a coordinator of polymer welding are assigned to the Institute of Electric Welding of the USSR Academy of Sciences. But in this wide-ranging task, ultrasonics are just one of many directions. And the institute cannot devote equal attention to all of them. On the other hand, they would certainly give due emphasis to ultrasonic fusion if they felt that this work was expected of them. But, evidently, the hypnosis of the initial successes has turned out to be so overpowering that both the USSR State Committee on Science and Technology's Commission on Plastics Welding and the Consumer ministries have preferred to confine themselves to what has already been achieved.

As a result, starting out as the first in world practice, and for a long time retaining leadership in this field, we are gradually giving up our position. Thus, for example, the power sources for the welding machines being put out by the industry are already failing to meet modern requirements. In the basic indicators--schematic design, dimensions, and weight--they are starting to be inferior to the latest developments of foreign firms. Ultrasonic sources of the necessary strength, based on piezoelectric ceramics, have still not been manufactured, without which it is impossible to create small-scale devices for installation welding. Things are going poorly with the control-measuring apparatus and the process control systems.

The situation which has been established might have been justified if the country had no scientific reserves in this area, or if there were no specialists qualified to handle the problems which have come up. But besides MVTU and VNIIESO, research and development of ultrasonic polymer welding is being done in many VUZes and other organizations. All that need be done is to collect these powers into a single strike force. What prevents this? Complacency? Or a reluctance to look into the future?

Instead of replying to these questions, an example from personal experience can be provided. For inclusion in the current five-year coordinating plan, we prepared suggestions for researching and creating new equipment for ultrasonic welding. In its parameters it should be favorably distinct from foreign analogs, allowing us to dispense with the import. But literally one day before confirmation of the plan, a staff member of the Soyuzelektroterm Association deleted VNIIESO from the executors. It seemed to him that the theme was not in keeping with the profile of the institute. How could he not have known that 20 years ago VNIIESO was a pioneer in founding ultrasonic welding, has subsequently ensured assembly-line production of the machinery, and remains the leading organization in the field? Thus a promising subject was left hanging in mid-air.

This incident is symptomatic. It says something about today's attitude toward ultrasonic welding. In the meantime, it is perfectly clear that the production of polymers and articles made from them will continue to grow steadily. And, where today, the work can be managed with separate machines, tomorrow will demand fully automatic, high-output production lines. When and by whom, and most important--on what sort of scientific foundation will they be created?

Answering these questions can hardly be put off for long. In science, the greatest danger is to lose momentum. Without it, yesterday's successes turn into marking time today, and tomorrow--falling behind.

12255
CSO: 1841/87

UDC 661.635:546.183

SYNTHESIS AND STUDY OF PROPERTIES OF PHOSPHATE BINDERS MODIFIED BY TRIVALENT PHOSPHORUS COMPOUNDS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 25, No 10, Oct 82 (manuscript received 27 Oct 80) pp 1163-1168

ZHENZHURIST, I. A., SIROTKIN, O. S. and KUZNETSOV, Ye. V., Department of Plastics Technology, Kazan Chemical Engineering Institute imeni S. M. Kirov

[Abstract] In recent years numerous inorganic polymers based on phosphate binders have been put to many technical uses. The authors studied possibilities of obtaining such binders modified with trivalent phosphorus, using metaphosphoric acid because of its ability to convert into polyphosphoric acids during hydrolysis. Magnesium, aluminum, silicon and chromium versions were synthesized. Infrared and X-ray photographs in the temperature range of 200-400° C were employed to clarify the processes involved. X-ray studies of structure of dried specimens did not show changes before and after heat hardening with the magnesium binder, and the processes observed in the alumophosphitophosphate binder are similarly explained by the amphoteric nature of the aluminum cation and its subsequent lesser activity compared to polyphosphoric acids. Derivatograms of silicon phosphitophosphate showed exopeaks at 320, 355, 386 and 420° C, and silicon attached to the polymer chain of trivalent phosphorus more readily than other variants. The chromium variant showed a suspension of chromium oxide and phosphitopolyphosphoric acid up to about 290° C, after which association of the acid with the chromium cation and disappearance of the chelate structure occurred. Figures 4; references 8 (Russian). [84-12131]

PLASTISIZATION OF POLYVINYLCHLORIDE BY MORPHOLIDES OF PHENYLPHOSPHORIC ACIDS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNLOGIYA in Russian Vol 25, No 10, Oct 82 (manuscript received 9 Dec 80) pp 1253-1257

REZNIK, Ye. A., KORCHAGINA, V. I., ORLOVA, Ye. M. and VOSKRESENSKIY, V. A., Department of Plastics, Kazan Engineering and Construction Institute

[Abstract] Despite wide study of organophosphoric compounds as fireproof plastisizers little has been written about such properties of amides of phosphorus acids, particularly orthophosphoric acid. The authors studied polyvinylchloride plastisization by morpholides of phenylphosphoric and diphenylphosphoric acids, using previous methodology. The products had physical chemical properties similar to standard phenylphosphates. Thermo-mechanical and physical mechanical properties and chemical durability were also measured. Concentration changes in hardness for PVC plastisized with morpholides compared to those plastisized with triphenylphosphate were related to the presence of two structural zones in the polymer-plastisizer system. The test PVC did not support combustion. Results indicated that the test morpholides could be used only in conjunction with dioctylphthalate plastisizers, in which case good qualities were obtained. Figures 4; references 14: 2 Russian, 12 English (11 US patents). [84-12131]

UDC 614.841.411:620.147.7

THERMOGRAVIMETRIC STUDY OF POLYETHYLENE TEREPHTHALATE IN PRESENCE OF FIREPROOFING ADDITIVES

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 82 (manuscript received 16 Nov 81) pp 26-27

BARANOVA, T. L., GALIULLINA, F. K., KRAPOTKIN, V. P. and AYZENSHTEYN, E. M.

[Abstract] The use of fireproofing agents GBDA, a brominated aromatic amine, DBDO, a brominated aromatic oxide or flamal 171, a phosphorus-halogen-containing additive on the combustion of polyethylene terephthalate was studied by thermogravimetry. Fire retardation was found to increase with bromine concentration up to 16 weight % and with phosphorus concentration to 1.6 weight %. All of the additives shift the thermogravimetric maximum to lower temperatures, with flamal 171 showing the greatest shift. The large change seen with the flamal 171 may be connected with catalysis of decomposition by carboxylate groups. GBDA catalyzed decomposition only weakly; DBDO is intermediate. Flamal 171 increases the amount of residue remaining after pyrolysis while the others decrease it in proportion to their

bromine content. Data indicate that DBDO and GBDA act only in the gas phase, while flamal 171 acts in both gas and condensed phases. Flamal 171 is the most effective flame retardant of the three tested. Figures 4; references 7 (Western).
[66-12126]

UDC 677.494.675.019.394

POLYCAPROAMIDE MONOFILAMENT SURFACE DESTRUCTION UNDER INFLUENCE OF
ATMOSPHERIC FACTORS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 82
(manuscript received 5 Aug 81) pp 31-34

NOSOV, M. P., TARASENKO, N. K., NAZARENKO, T. S., CHEISHVILI, R. V.,
ZHIYEMYALIS, R. F. and KABAYEV, M. M.

[Abstract] The effect of three year exposure to East Gruzinian weather conditions on polycaproamide monofilaments was studied on unstabilized filaments and on filaments containing either the oxydiphenylamide heat stabilizer N-1 or the copper complex, light stabilizer PM-1. Filament viscosity was found to decrease with increasing exposure to the elements. The time required to destroy the surface layer in 31% sulfuric acid decreased similarly. These results suggest intensive destruction of filament surface. Field-contrast micrography demonstrated that cracks develop in the interfibrillar layer, which does not lower monofilament stability. Changes were independent of stabilizer presence or type. IR spectra demonstrated sharp changes after exposure, associated with formation of hydroperoxide and ether bonds and cross-links. The increase in the intensity of the 930 cm^{-1} band characteristic of crystalline samples and decrease in dichroism of the 120 cm^{-1} band suggest that photodestruction proceeds mainly in amorphous regions. Internal regions of the filaments were unaffected by exposure. Since the stabilizers do not have any protective effect, one may conclude that moisture and surface-active substances play the major role in the changes. Figures 4; references 9: 7 Russian, 2 Western.
[66-12126]

THERMOFIXATION OF CHEMOSTABLE F-2M AND F-4MB FLUOROPOLYMER FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 5, Sep-Oct 82
(manuscript received 15 Feb 82) pp 42-44

ZOSIN, L. P., MIN'KOVA, N. D., DORUTINA, T. S., KUZ'MIN, V. N.,
VERKHOVETS, A. P. and ZUBKO, L. M.

[Abstract] The effect of thermal treatment on fibers extruded from the fluoropolymers F-2M and F-4MB was studied. Thermomechanical analysis demonstrated that thermal treatment at a temperature close to the melting point decreased shrinkage on subsequent heating by a factor of six for F-2M and a factor of two for F-4MB. This effect was observed only at low temperatures, not in the devitrification region. Thermal treatment was found to be kinetic and not to decrease fiber stability. Isometric heating showed that thermofixation sharply lowers internal stress. The linear relationship between stability and temperature leads to an activation energy for mechanical destruction of 130 KJoules/mole for F-2M and 121 KJoules/mole for F-4MB, independent of thermal treatment. The degree of crystallinity of F-4MB appears to increase after thermofixation. Figures 2; references 7 (Russian).

[66-12126]

UDC 547.584'391.3-16:541.036

DURABILITY AND DEFORMATION PROPERTIES OF PHOTO-HARDENED COMPOSITIONS BASED ON α,ω -METHACRYL(BIS-DIETHYLENEGLYCOL)PHTHALATE AND THEIR BEHAVIOR DURING THERMAL DECOMPOSITION

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 5, Sep-Oct 82 (manuscript received 28 May 81) pp 577-584

KUTNER, E. A., PERNIKOS, R. Ya., VAYNSHTEYN, A. B., VEYNBERG, N. G.,
ZARINYA, L. V. and KARLIVAN, V. P., Riga Polytechnic Institute; Institute
of Wood Chemistry, LaSSR Academy of Sciences

[Abstract] Title properties were studied for the title phthalate (MDP-2) and mixtures of MDP-2 with xylite oligocarbonatemethacrylate (OCMA), tri(hydroxyethylene)- α,ω -dimethacrylate (TGM-3) and methylmethacrylate (MMA). It was learned that with increased exposure to radiation the durability of MDP-2, its mixture with TGM-3 and OCMA first increased and then tended to decline. In the transition from methacrylic polymerizing oligomers to acrylic forms, an increase in length and flexibility of the oligomer block was accompanied by declining durability during stretching, while, when carbonates and other groups were introduced into the oligomer, increased durability of the latticed polymer occurred. This was attributed in part to chemical cross-linking. TGM-3 was found less capable of photo-hardening.

Deformability of compositions was greater with MMA and less with OCMX. Derivographic studies are also reported. These and differential thermal analysis showed that decomposition took place in multiple stages, which were related to non-polymer portions of the compositions and other structural variations. The effective energy of activation of thermo-oxidative destruction of photo-hardened mixtures was lower than that for the MDP-2 homopolymer. Figures 7; references 16: 13 Russian, 3 Western.
[90-12131]

UDC 546.799.85

EXISTENCE OF PENTAVALENT CALIFORNIUM IN AQUEOUS MEDIUM

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 5 May 82) pp 551-553

KOSYAKOV, V. N., YERIN, Ye. A., VITYUTNEV, V. M., KOPYTOV, V. V. and
RYKOV, A. G.

[Abstract] An attempt was made to obtain pentavalent californium in the following manner. A 150-200 μg sample of freshly purified ^{249}Bk in a 4 mole per liter K_2CO_3 solution was placed in a special vessel containing 20 mg/ml $\text{Na}_4\text{UO}_2(\text{CO}_3)_3$. Ozone (about 5% of O_3 in oxygen) was then bubbled through this mixture for 18-23 hrs. The contents were then centrifuged and both the supernatant liquid and the precipitate were analyzed for the contents of ^{249}Bk and ^{249}Cf . The results showed that about 10% of californium formed from the β -breakdown of ^{249}Bk was found in form of the CfO_2^+ ion, which appeared to be quite stable. The ozonation needed to be performed only in the early stage of the experiment (for the first 1.5 hrs). The relatively low yield of CfO_2^+ was explained by low stability of the nonoxygenated Cf^{5+} formed initially, of which only a small portion could be stabilized as the CfO_2^+ ion. Figures 1; references 10: 5 Russian, 5 Western.
[75-7813]

UDC 550.93

GEOCHEMICAL RATE CONSTANT FOR SPONTANEOUS CONVERSION OF URANIUM-238 TO XENON

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 17 Jul 81) pp 559-562

KAPUSTA, Ya. S. and MATUKOV, D. I.

[Abstract] Xenon is a product of spontaneous breakdown of uranium-238. It is accumulated in natural minerals from the beginning of geological times. Its quantity can be determined from a formula which utilizes a rate constant of spontaneous conversion of uranium-238 to Xe ($\lambda_S \cdot y_{\text{XeS}}$). The goal of the

present study was to determine this constant more accurately by determining xenon accumulation in natural minerals. Monomineral fractions of zircons from the Southern Urals and from Finland were used in these experiments. It was determined that these specimens were 1350 and 1540 million years old. Isotope composition of Xe in test samples was determined indicating that they consisted of a mixture of two xenons: a product of spontaneous breakdown of uranium-238 and of atmospheric xenon. The $\lambda_{S.yXeS}$ constant was recalculated and a value of $1.84 \pm 0.04 \times 10^{-17} \cdot \text{hr}^{-1}$ was obtained for it. Figures 3; references 9: 7 Russian, 2 Western. [75-7813]

UDC 541.188.541.6:543.42

ISOLATION AND INVESTIGATION OF SOME γ -RADIOLYSIS PRODUCTS OF VINYLPIRIDINE ANIONITE

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 7 Dec 81) pp 563-566

VYSOKOOSTROVSKAYA, N. B., KALASHNIKOV, V. M. and NIKOL'SKIY, B. P.

[Abstract] Vinylpyridine (VP) anion exchange resins are widely used in radio-chemistry because of their high stability in acid media. Because of the paucity of data on the composition and properties of radiolysis products (RP) of these resins, an attempt was made to fill this gap using an anion exchange resin VP-1 AP, an alkylated macroporous copolymer of 2,5-methylvinylpyridine and divinylbenzene. γ -Irradiation with ^{60}Co was performed in 7.5 mole/l of nitric acid. The yield of RP increased with irradiation. Analysis of the IR spectra of the RP separated by two dimensional TLC supported an earlier finding that the VP anion exchange resins undergo partial oxidation and nitration during γ -radiolysis. Figures 5; references 10: 9 Russian, (one by a Western author), 1 Western. [75-7813]

UDC 543.53:553.495:621.039.5

MODERN RADIOCHEMICAL STUDY METHODS OF NATURAL NUCLEAR REACTORS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 17 Dec 81) pp 570-575

KRUGLOV, A. K., PCHELKIN, V. A., SVIDERSKIY, M. F. and MOSHCHANSKAYA, N. G.

[Abstract] Uranium-containing ores may be viewed as subcritical systems which could result in spontaneous chain reactions--the so called natural

nuclear reactors (NNR). Indications of such a NNR were found in Gabon, in the formation "Oklo"; this appears to be the only such resource for studying the activity of a nuclear reactor under natural conditions. Experiments were carried out on powdered specimens from the shaft #35 of the "Oklo" formation. By means of radiochemical methods the age of the "reactor", the neutron flow during the activity of this NNR, the conversion index and duration of the reaction were determined. It was shown that practically all of thorium found in specimens from the reaction zone was formed in the NNR process by reactions (n, γ) and $(n, 2n)$; thorium content was practically linearly related to the degree of uranium-235 burn-down. It was also shown that the leaching out method could be used to identify traces of broken down plutonium-239. This method was recommended for other studies of NNR's. Figures 2; references 11: 5 Russian, 6 Western.

[75-7813]

UDC 546.79:542.49:66.048

ISOLATION OF RADIONUCLIDES FROM MELTED IRRADIATED MEDIA BY MOLECULAR DISTILLATION METHOD

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 17 Dec 81) pp 588-590

YERSHOVA, Z. V., PETROV, B. V. and KLABUKOV, Yu. G.

[Abstract] Isolation of radionuclides from irradiated media produces liquid wastes which need to be safeguarded because they could be potential pollutants of the environment. A molecular distillation process for isolation of radionuclides from melted irradiated media was analyzed from three points of interest: a) radiation safety for personnel and environment protection, b) maximum yield with as complete as possible extraction and concentration and c) economy of the process. The safety of this operation will depend on being able to perform molecular distillation in a sealed vacuum system, on keeping the quantity of radionuclides to a minimum and on avoiding formations of liquid radioactive wastes. The optimal conditions depend on thermodynamic optimization of all components of the process: evaporation, condensation, heat transfer, etc. All processes involved should be reversible except for the heat transfer. Molecular distillation should be carried out with the condensation surface temperature being considerably below the evaporation temperature. Three applications of molecular distillation were analyzed: isolation of polonium-210 from irradiated bismuth, isolation of tritium from Li and Li-Pb eutectic mixture and isolation of nuclear fuel nuclides. References 6: 5 Russian, 1 Western.

[75-7813]

MIXED SELENIDES OF URANIUM AND YTTRIUM SUBGROUP REE WITH COMPOSITIONS
 $\text{Ln}_2\text{U}_2\text{Se}_7$, $\text{Ln}_4\text{U}_5\text{Se}_{16}$ AND $\text{Ln}_{0.5}\text{U}_{0.5}\text{Se}_2$

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
 (manuscript received 30 Nov 81) pp 597-600

GRACHEVA, N. V., KUZNETSOV, N. T. and SLOVYANSKIKH, V. K.

[Abstract] Reactions of uranium selenides with yttrium subgroup rare earth elements were studied by differential-thermal methods using x-ray structural and x-ray phase analysis as well as chemical analysis coupled with gas transport method. Following types of compounds were found to be formed in this system: $\text{Ln}_2\text{U}_2\text{Se}_7$, $\text{Ln}_4\text{U}_5\text{Se}_{16}$, $\text{Ln}_{0.5}\text{U}_{0.5}\text{Se}_2$ and $\text{Yb}_2\text{U}_{0.9}\text{Se}_4$. These samples were obtained by vacuum-thermal method followed by fusion in an arc furnace. Crystalline lattice parameters for these compounds were tabulated. Figures 3; no references.

[75-7813]

EXTRACTION OF URANIUM FROM SOLUTIONS USING INORGANIC SORBENTS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
 (manuscript received 30 Nov 81) pp 628-630

NURIYEV, A. N., SHIK, E. I., KULIYEV, A. A., ABDULLAYEVA, R. S.,
 MAMEDOV, R. M. and MAMEDOVA, Z. M.

[Abstract] Several modified silicon sorbents were synthesized which adsorbed selectively uranium from sea water and from synthetic sea water model. The sorbents were dried at 120°C, because at this temperature optimal results were obtained. Thermal treatment at higher temperatures led to some loss of active hydroxyl groups resulting in lower adsorption capacity. It was shown that inorganic salts (NaCl , KCl , MgCl , CaCl_2) did not interfere with the sorption process which appeared to be optimal in the pH range of 5-8. The experimental sorbents did not remove Li, B, Br and Al from the solutions and adsorbed only insignificant amounts of Zn and Cu. IR analysis of the sorption products showed characteristic bands of the starting sorbent, uranyl ion and carbonate ion. Figures 3; no references.

[75-7813]

SYNTHESIS OF TRITIUM LABELED BIOLOGICALLY ACTIVE COMPOUNDS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 30 Nov 81) pp 637-642

SHEVCHENKO, V. P. and MYASOYEDOV, N. F.

[Abstract] Introduction of a tritium label into a biologically active compound is an important scientific problem. A relatively novel method for introduction of such a marker was investigated: heterogenic catalytic isotope exchange using gaseous tritium in solution. Several catalysts, different solvents and a range of pressures and temperatures were investigated. The following was found to be the method of choice: for saturated compounds the catalyst was palladium over barium sulfate (a 1:2 ratio of the reagent to palladium) and the reaction time was 3-5 hrs; for unsaturated compounds Lindlar catalyst was used (in a 1:1 ratio) in a 1-3 hrs reaction. Dioxan was by far the best solvent, but the exchange was also carried out in other solvents. Using this method, it was possible to triturate following types of compounds: prostaglandins, phospholipids, sphingolipids, steroids, methyl esters of fatty acids, biogenic amines, etc. Aromatic structures appeared to be stable under these conditions. In unsaturated products the label was found in the allyl position and at the double bonds. The exchange reaction was complicated by hydrogenation, cis-trans isomerization and a double bond shift. The byproducts could be removed easily by chromatographic purification. In principle, this method was found to be suitable for synthesis of many compounds, but specific conditions needed to be developed for individual cases. No figures or references.
[75-7813]

UDC 543.53:621.039.54

ISOLATION PROCESSES FOR TRANSPLUTONIUM ELEMENTS FROM VARIOUS IRRADIATED MATERIALS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 17 Dec 81) pp 648-655

NIKOLAYEV, V. M., KARELIN, Ye. A., FILIMONOV, V. T. and GORDEYEV, Ya. N.

[Abstract] A method was developed for isolation of transplutonium elements (TPE) from targets irradiated on MIR and SM-2 reactors. The process is based on multistage extraction which includes: solution of irradiated material, extraction of plutonium with trialkylamine (TAA), purification of TPE from various breakdown products using a system consisting of di(-ethylhexyl)phosphoric acid in diethyl benzene - diethylenetriaminopentaacetic acid - citric acid, followed by concentration of TPE and separation of

americium, curium, berkelium and californium. This method assures high purification coefficients: californium and curium from ruthenium - 10^6 , from cesium - 10^6 , from zirconium - 3×10^5 , from niobium - 10^6 and from cesium - 2×10^5 . Purification coefficient of californium from curium is 10^4 with a 99% yield. The method is applicable to all stages of TPA accumulation. Figures 7; references 25: 21 Russian, 4 Western.
[75-7813]

UDC 543.53:621.039.54

RADIOCHEMICAL STUDY OF SPENT FUEL COMPOSITION FROM VVER REACTOR

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 27 Jan 82) pp 656-663

STEPANOV, A. V., MAKAROVA, T. P., LIPOVSKIY, A. A., AKOPOV, G. A.,
BIBICHEV, B. A., LOVTSYUS, A. V., NIKITINA, S. A., PREOBRAZHenskAYA, L. D.,
BELYAYEV, B. N., RYZHINSKIY, M. V. and FRIDKIN, A. M.

[Abstract] One of the most important tasks connected with the control of the regeneration process of spent fuels is obtaining data on the composition of technological products. Several radiochemical methods were reviewed with respect to the advantages and shortcomings of their utilization. It was concluded that currently there is an adequate selection of such methods, especially when coupled with mass-spectrometry and alpha-spectrometry. Their application of a large scale is problematic, however, because of technical difficulties and high radioactivity of the materials being studied. Because of the latter the maximum permissible samples that can be handled are at the lower border of test sensitivity. In future, non-destructive methods must be developed, such as γ -spectrometry. Presently, however it is still below the accuracy of radiochemical methods. It was proposed that radiochemical methods of analysis should be used to correct theoretically calculated analytical programs and to calibrate the nondestructive analytical methods. As these methods become more refined, the need for radiochemical analyses will diminish and the calculated programs will provide adequate data on the composition of spent fuel. Figures 6; no references.
[75-7813]

ROCK SALT AS MEDIUM FOR BURIAL OF RADIOACTIVE WASTES

Leningrad RADIOKHIMIYA in Russian Vol 24, No 5, Sep-Oct 82
(manuscript received 17 Dec 81) pp 664-670

KRIVOKHATSKIY, A. S., ROGOZIN, Yu. M., BRYZGALOVA, R. V., SINITSYNA, G. S.,
SAVONENKOV, V. G. and RODIONOV, Yu. I.

[Abstract] Disposal of radioactive wastes is a serious problem of nuclear energy. One of the most promising methods is to store them in deep geological formations because many of them must be isolated for hundreds and even thousands years, some even for practical eternity. One of the better geological formations for this purpose is rock salt. Rock salt deposits are available throughout the entire earth, they are least liable to be subject to earthquakes, they extend for thousands of kilometers in up to 8 km deep layers of homogeneous mass, free of impurities. Underground water is not a problem and the cracks and fissures are self-filling. Several engineering aspects connected with storage of medium and highly active wastes in rock salt formations have been discussed (containers, delivery, storage caverns). Figures 4; references 19: 16 Russian (2 by Western authors), 3 Western.
[75-7813]

UDC 541.64:536.7

PHASE STRUCTURE OF EPOXY-RESIN SYSTEMS

Moscow USPEKHI KHIMII in Russian Vol 51, No 10, Oct 82 pp 1733-1752

VOLKOV, V. P., ROGINSKAYA, G. F., CHALYKH, A. Ye. and ROZENBERG, B. A.,
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[Abstract] This is a review article on the regulatory aspects of the formation of phase structure of epoxy-resin systems (ERS), including questions of phase equilibrium and interdiffusion of various components during three dimensional polycondensation of an epoxy oligomer. Following topics are addressed: phase equilibrium and interdiffusion in the starting systems and in solidifying epoxy-resin, and mechanism of the formation of phase structure. The characteristics of phase structure are determined by thermodynamic properties of the components and by the conditions existing during the solidification of ERS. Average size and polydispersion of resin particles in solid ERP can be varied considerably. A change in the temperature of solidification process shows a complex effect on structure formation. Future studies of heterophasic polymer compositions should concentrate on development of quantitative theory of the formation process of the phase structure. References 102: 55 Russian (16 by Western authors), 47 Western.
[73-7813]

POLYMERIZATION OF BUTADIENE IN PRESENCE OF MIXED TITANIUM HALIDE AND HIGHER ORGANIC ALUMINUM COMPOUNDS

Moscow KAUCHUK I REZINA in Russian No 11, Nov 82
(manuscript received 28 Jun 82) pp 15-16

KOVRIZHKO, L. F., GOSTEV, M. M., CHERKASHINA, I. M. and MONAKOV, Yu. B.,
Voronezh Synthetic Rubber Plant imeni S. M. Kirov

[Abstract] Cis-polybutadiene-1,4 is produced with a Cigler-Natt catalytic system based partially on organic aluminum compounds and titanium salts, whose stereospecificity depends on the nature of the transitional metal and its ligand surroundings. Industrial production of butadiene rubber utilizes triisobutyl aluminum (TIBA) as the catalyst. Due to its fire danger in the titanium catalytic system, the authors studied the possibility of replacing TIBA with less inflammable higher organic aluminum compounds (HOAC). Two variants of HOAC were prepared; HOAC-1 was synthesized by directing hydrogen at 150° C through a mixture of aluminum powder and coking benzene of low-sulfur petroleum, HOAC-2 by transalkylation of TIBA at 150° C. Polymerization of butadiene was carried out with TIBA, HOAC-1 and HOAC-2. Tests showed the catalytic activity of HOAC-1 to be less, and that of HOAC-2 to equal, TIBA. Molecular weight distribution and physical mechanical properties of vulcanisates produced in the presence of TIBA or HOAC were practically the same. Figures 2; references 8: 6 Russian, 2 Western.
[83-12131]

UDC 678.011.678.048

IMPROVING RESISTANCE TO THERMOPLASTISIZATION OF SKS-30AKO RUBBER DURING DRYING

Moscow KAUCHUK I REZINA in Russian No 11, Nov 82
(manuscript received 28 Jun 82) pp 18-20

ANTONOVA, A. M., TSYRLOV, M. Ya., SLUKINA, Z. D. and IVANOV, Yu. A.,
Voronezh Synthetic Rubber Factory imeni S. M. Kirov

[Abstract] Production of synthetic butadiene-styrene SKS-30AKO rubber for use in the technical asbestos industry is more complex and laborious than production of other types of butadiene-styrene. The authors examined the effect of temperature levels on drying and the effect of the nature of the antioxidant on the rubber quality. They studied a sample of rubber from a pilot plant, produced through latex coagulation by sodium chloride and sulfuric acid or by alumopotassium alums. "Defoe" rigidity, determined by standard methods, was found to decline with heat rise in drying when 2 percent "naftam-2" antioxidant was used and temperature was increased from 80 to 100° C. Further temperature increase to 120° C brought severe

thermoplastisization, and rigidity decrease by a factor of 1.5-3. Durability properties of the test rubber did not vary significantly with increased temperatures and were not dependent on the nature of antioxidants. Best prevention of thermal destruction came at a drying temperature of 100° C and with naftam-2 as the antioxidant.
[83-12131]

UDC 668.543.563:661.183

ADSORPTION PURIFICATION OF COKE BY-PRODUCT INDUSTRY WASTE WATER USING
SPHERICAL CARBON ADSORBENTS

Moscow KOKS I KHIMIYA in Russian No 11, Nov 82 pp 49-52

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[Abstract] The purification of water containing volatile and nonvolatile phenols, as found in the second stage of purifying effluent water from coke by-product plants, was studied in detail. A two-stage purification was used: first the effluent was preliminarily filtered through K2 carbon and then was treated with spherical carbon adsorbent (as developed by the Institute of Fossil Fuels). Spherical carbon adsorbent particles with diameters of 0.25-1.0 mm were used. That size had been demonstrated, earlier, to be optimum for removal of harmful organic admixtures from waste waters. Adsorption isotherms and the dynamic influence of the flowing phenol concentration on the quantity of purified water were determined for a phenol-water model system. Dynamic sorbent activity was independent of phenol concentration over the 1-5 g/l range considered, while static activity increased 23% at 0.65 m/hr in this range. At low flow rate, external mass transport was limiting, with some contribution from external diffusion at high concentrations, while at 5 m/hr internal diffusion was limiting. Trials with waste water samples indicate that an increase in concentration of volatile phenols leads to an increase in the dynamic activity of the particles and degree of utilization of the working layer. The carbon adsorbent was also highly active in removing nonvolatile phenols, the presence of which increased purification effectiveness. Preliminary experiments with boiling 10% alkali resulted in desorption of 80-85% of the phenols. Recovery of these valuable phenols is a desirable step. Subsequent thermal treatment led to complete regeneration of active adsorbent. Figures 4; references 5 (Russian).

[65-12126]

MISCELLANEOUS

UDC 541.182.42:532.783.004.3

MICROCAPSULATION OF LIQUID CRYSTALLINE MATERIALS

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA
TEKHOLOGIYA in Russian Vol 25, No 10, Oct 82 (manuscript received 5 Jan 82)
pp 1221-1233

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[Abstract] Microcapsulation, introduced some 25 years ago using high-molecular substances, has gained an important place in chemical technology. It is used on solid, liquid and gaseous products to aid in storage and transportation, in medicine, to assist in administering medications, in the perfume industry for storing ethereal oils, in biology for storing and timed delivery of synthetic cells, and in many other applications. The title materials often cannot be employed in technology because of their rheological properties, and in this case microcapsulation is especially useful. Among thermotropic liquid crystals, the most interest has been stirred by cholesterol liquid crystals, which have a complex asymmetrical structure, with elongated or platelike forms and a rigid skeleton with double bonds. Their molecular structure is a spiral, which affects selective dispersion, circular dichroism and reverse optical activity. Uses include determining electrical and magnetic fields and measuring precise temperature values. Microcapsulation enhances their stability. Among various methods of microcapsulation, colloid chemical procedures involving coacervation and subsequent processing for specific uses is the favored method. Another promising approach involves use of gelatinous coatings, but current research has not really determined the better method of these two. Study of the connection between pH and electrophoretic mobility of cholesterol liquid crystals has shown the latter to decline with increasing acidity of the medium. Figures 9; references 94: 41 Russian, 53 Western.
[84-12131]

CSO: 1841

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feb 22, 1983